

USAWC STRATEGY RESEARCH PROJECT

KNOWLEDGE MANAGEMENT IN AN INFORMATION AGE ARMY

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ABSTRACT

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The widespread application of advanced information technologies has dramatically affected United States fighting forces. Senior leaders at all levels that came of age as principals before the technological revolution of the 90's have struggled to take full advantage of modern information technology. Information technology exploitation strategies have been further complicated by the now omnipresent Joint and Combined nature of our operations. Key leaders need to more fully embrace the comprehensive strategy already available to take full advantage of this explosion in capability. This work examines the Army's current knowledge management strategy and suggests that a consistent construct is required at the CORPS and Division level to fully exploit current information technology capabilities in a joint and combined environment. This construct is required to move our fighting forces beyond the simplistic incorporation of the latest information technology hardware and software to a more deliberate knowledge management strategy: the logical extension of the information age technology and network-centric operations to effective Knowledge Management. This organizational construct should be disciplined enough to resist the latest hardware/software solution of the day and agile enough to readily adopt innovative information technology solutions addressing critical organizational information sharing and knowledge management challenges.

KNOWLEDGE MANAGEMENT IN AN INFORMATION AGE ARMY

Fortune favors the prepared mind

—Louis Pasteur

The widespread application of advanced information technologies in the modern battle space has dramatically impacted our fighting forces. The miracle of modern communications and the ubiquitous presence of the microprocessor have combined to create a growing level of battle space awareness that previously was unachievable if even imaginable. This improved battle space awareness coupled with an equally unparalleled ability to act on that awareness while significantly enhancing our force capabilities has also significantly challenged our leaders. Senior leaders who came of age as principals before the technological revolution of the 90's have struggled to fully capitalize on the broader implications of modern information and communications technology and to take full advantage of its benefits. Information technology exploitation strategies have been further complicated by the pressing need to fully facilitate the Joint and Combined nature of our current and future operations and the ever accelerating pace of technological change. Key senior leaders need to step out in accordance with joint and service guidance to employ innovative organizational strategies to take full advantage of the information technology revolution at the Joint and Combined Task Force level. Aggressive strategies employed both in institutional and field Army as applied systematically in support of joint and combined task force operations will allow U.S. forces to move beyond the simplistic incorporation of the latest hardware solutions to a more deliberate high payoff solution. The deliberate management of key changes in doctrine, organizations, training, material, leadership and education, personnel, and facilities (DOTMLPF) will lead to the deliberate logical extension of the information age environment and network centric warfare to an effective knowledge enabled force. The construct must be disciplined enough across the DOTMLPF to transcend the normal propensity to chase the latest hardware solution of the day and yet aggressive enough to move forward in a substantive and deliberate fashion to effectively address the fundamental issues of organizational collaboration and warfighting effectiveness.

From the earliest sparks of intelligence, mankind has continually advanced over the millennia at an ever accelerating rate. We have moved forward from the most primitive of social structures, characterized by cave dwellings and foraging for food, to complex organizational constructs exemplified by vast living complexes of finely engineered steel, concrete and glass with foods now produced, processed, and prepackaged for our convenience. Unlike just a hundred years ago, we live in a world that our fathers could not have imagined while our

children are growing up in a technology driven world that we have ever more difficulty comprehending. Just as society at large is advancing at an ever dizzying pace so are our means to make war. Our armed forces cannot afford the traditional military conservatism of past times for creative

innovation [in war] has been speeding up. It took at least two hundred years for the Gunpowder Revolution to come to fruition (c. 1500-1700); one hundred and fifty years for the First Industrial Revolution (c. 1750-1900); forty years for the Second Industrial Revolution (c. 1900-1940); and just thirty years for the Information Revolution (c. 1970-2000). That means that keeping up with the pace of change is getting harder than ever, and the risks of getting left behind are rising.¹

As is oft times stated the only constant in our Army is change, unfortunately that axiom must be adjusted to reflect the ever more daunting reality of *accelerating* change particularly in the information domain. The 2005 Capstone Concept for Joint Operations recognizes that

while the nature of war will remain a violent clash of wills between armed groups pursuing advantageous political ends, the conduct of future warfare will include combinations of conventional and unconventional, kinetic and non-kinetic, and military and nonmilitary actions and operations, all of which add to the increasing complexity of the future security environment.²

Given that as Martin Van Creveld asserts “war is completely permeated by technology and governed by it”,³ we must put in place the people, principles and institutions that can effectively govern that rapidly advancing technology.

One of the fundamental forces changing the dynamics of our global, social, and political structures is the ongoing explosion in information and communications technology. It is all but impossible to imagine our modern force successfully waging war without the all pervasive personal computer and information networks that stretch across the battle space to provide today’s unprecedented access and ability to manipulate information. These advances have facilitated an unprecedented level of military proficiency and recent success cementing the United States position as the sole reigning superpower in the world. But “technology alone rarely confers an insurmountable military edge; tactics, organization, training, leadership, and other products of an effective bureaucracy are necessary to realize the full potential of new inventions.”⁴ Although, the current combination of information and communications technologies is being molded into the network centric warfare paradigm, further change is required to keep our forces moving ahead of our adversaries. “History is full of examples of superpowers failing to take advantage of important Revolutions in Military Affairs...The warning that appears at the bottom of mutual fund advertisements applies to geopolitics: *Past performance is no guarantee of future returns.*”⁵ Certainly the information technology explosion

is no different than the technology boom at large and continues to require our study and innovation.

“No technical advance by itself made a revolution; it was how people responded to technology that produced seismic shifts in warfare.”⁶ “The way to gain a military advantage, therefore, is not necessarily to be the first to produce a new tool or weapon. Often it is to figure out better than anyone else how to utilize a widely available tool or weapon.”⁷ I maintain that as we continue to refine our network centric concepts of war we must aggressively explore the next level of 21st century knowledge enabled operations across the entire joint force organization. Our efforts must progress beyond the optimized connection of shooter to sensor to decision maker to facilitate a knowledge enabled force; a force that maximizes the full potential of all the elements of each of its warfighting headquarters as well as its forward formations. Several organizational initiatives are underway to incorporate knowledge management concepts and structure at the COCOM level within our force; but, these initiatives must be further extended down to our forward warfighting formations. One of the means to accomplish this is by fully supporting a DOTMLPF facilitated Army knowledge management structure across the entire Army force structure with increased emphasis on those headquarters that will form the base of Joint Task Force elements.

Knowledge Management as a Concept for Capturing Innovation and Achieving Decision Dominance

Knowledge Management is defined as a deliberate, systematic business optimization strategy that selects, distills stores, organizes, packages and communicates information essential to the business of a company or organization in a manner that improves employee performance and corporate competitiveness.⁸ As our forces move beyond the developing network-centric warfare concepts connecting the sensor, shooter, and decision maker, a natural evolution and maturation is required in our information processes. The globally connected world of today mandates that our forces nurture, embrace and manage fundamental changes in our organizations. The accelerating information capabilities permeating our force require us to adopt a disciplined information exchange change process that recognizes the value of our current structure and yet seeks organizational innovation. The Defense Quadrennial Review calls for an ongoing “shift of emphasis to meet [this] new strategic environment”⁹ to include a shift “from an emphasis on ships, guns, tanks and planes – to focus on information, knowledge and actionable intelligence.”¹⁰ This ability to capitalize on local innovation and successfully incorporate that innovation into a facilitating organizational framework is clearly critical as we push information technology enablers further down into our warfighting organizations. We need

to create the structure and people that are able to serve as expert organizational facilitators in our rapidly evolving information technology environment. The business world is showing us every day that “the further we push out the boundaries of knowledge and innovation the more the next great value breakthroughs...will come from putting together disparate things that you would not think of as going together.”¹¹ Thus to foster the development of a knowledge enabled force; a force that maximizes the full potential of all the elements of its warfighting headquarters, a disciplined standardized knowledge management team is required to both create and capitalize on these growing innovative opportunities.

A resourced Knowledge management strategy is the facilitating foundation in “an organization committed to *ubiquitous* communications and *invisible* technology, where through information sharing and organizational learning built on trust and respect, people at all levels can make and implement efficient and agile decisions.”¹² Constituent members of Joint Task Forces today are empowered with connectivity, access and the ability to exchange tremendous amounts of information in a routine manner. To fully leverage our information exchange advantage however, our warfighting culture, people, and organizations must adapt. Knowledge management processes and structure must be built to readily evolve the current processes and adopt the requisite technologies. The full spectrum of leaders, staff, and troops must be committed to change that will allow our warfighting formations’ fundamental culture to be adapted to the new reality of ubiquitous information technology enablers. Our Army must fully accept the requirement to facilitate this cultural change with the right organizational and personnel changes to institutionalize knowledge management as a respected organizational process critical to the organization’s success. Finally, the leaders of our organization must recognize that technology is only an enabler and not the essence of the knowledge revolution underway. For our Army to truly operate as an adaptive knowledge enabled part of a joint and combined force we must actively address culture, people, organizations and lastly technology to actively adapt and grow.

Culture

“A commitment to managing knowledge more effectively almost always requires better knowledge sharing among individuals, groups, and operating units to improve organizational learning and overall performance.”¹³ While our armed forces have always placed a premium on teamwork and organizational success, a culture of even greater information sharing must be realized. Every member of an organization contributes to the culture in some manner. The history, style of leadership, structural stability, level of workforce empowerment and the ability to

adapt to a changing environment all contribute to the culture of an organization.¹⁴ Even in high performing organizations committed to change there are many cultural factors that may inhibit knowledge transfer. They are called inhibitors because they slow or prevent transfer and are likely to erode some of the knowledge as it tries to move through organizations.¹⁵ These may include: lack of trust; differences in cultures, vocabularies, frames of reference; lack of time and meeting places, narrow ideas of productive work; status and rewards only going to knowledge owners; lack of absorptive capacity in recipients; belief that knowledge is the prerogative of particular groups, along with intolerance for mistakes or need for help.¹⁶ To overcome these cultural challenges remaining within the Army, a serious commitment to change management will be required to gain and facilitate a full understanding of the cultural barriers to an integrated joint force knowledge environment. Once we begin to understand the culture of our joint formations, we can begin to understand who all the key people are and how an organizational structure can be optimized to institutionalize effective change in the context of the organizations knowledge processes.

People and Organizations

In order for a truly knowledge based organization to be fully effective, it cannot allow itself to be stymied by bureaucratic, overly compartmented, classic staff management and reporting procedures. The physical and virtual walls must be removed to facilitate more open lines of communication and the focused ability to rapidly share information internally, externally, horizontally as well as vertically. The key to achieving this goal is a determined, disciplined effort to gain, maintain and reinforce trust among organizational members at all levels. The basic functions of personnel, intelligence, operations, logistics and communications can not be seen as individual centers of gravity but rather parts of a larger interacting decision facilitator. Knowledge can be described as the capacity for effective action or decision making in the context of the organization.¹⁷ Thus understanding how the organizational and its people intertwine will facilitate the full implementation of a crucial knowledge management process that is agile and adaptable enough to respond in today's accelerating information technology environment. Given that effective knowledge management requires one to constantly evaluate the current bureaucratic systems and the organization's changing people in the context of the fundamental facilitating technology, it is imperative to have a disciplined knowledge management process to assist the force commander.

Processes

As knowledge management continues to mature and evolve, it is clear that real success does not come from simply grafting knowledge activities onto existing work processes.¹⁸ Instead, the knowledge management process has to be mixed and “baked” into key knowledge work processes.¹⁹ How the future force creates, shares, and applies knowledge must be blended across the organization’s analysts, operators, and executors on a continuous basis. Explicit linkages must exist between knowledge management and the fundamental processes it is designed to facilitate. The linkages must specify how knowledge should be imported to and exported from the organization, when and how in the organization this knowledge should be used, and what difference it should make in the outcome.²⁰ Further, as the joint force organizational processes are modified, it will be important to ensure these linkages are established with a clear understanding of the mission, culture, people, organizational goals and available technology.

Technology as an Enabler Not a Solution

Although the phenomenon of knowledge management was given birth, to a large degree, by the appearance of the Internet and its brethren, intranets and extranets; fundamentally knowledge management is more about people and corporate/organizational culture than it is about technology.²¹ Unless the organization’s culture encourages knowledge sharing in a specific work context, then applying IT to knowledge transfer problems will have almost no impact. Except in unusual cases, leading with a technology-based solution is a recipe for failure.²² The Army’s knowledge management solution provides for a loose pairing between technology and staff architectures so that existing technology infrastructure facilitates the evolution of the staff processes that can be leveraged when in a joint environment. It is essential to tie not only technology, but processes, people, organization and culture together in order to achieve a viable information sharing environment that can withstand the stresses combat in our constantly changing task force organizations.

The Army Strategic Knowledge Management Plan as a Construct for Implementation

Given the essential nature of knowledge management to the successful organization, it is imperative that information sharing across the organization be actively managed. Recognizing this fact, the Army’s approach to knowledge management integrates and establishes a systematic approach to identifying, managing, and sharing enterprise-wide information assets.²³ Today’s volatile climate demands a new attitude and approach... actions must be anticipatory, adaptive, and based on a faster cycle of knowledge creation retention and distribution²⁴.

Mastering our use of the full range of information products now available across our force organizations is absolutely essential if we wish to achieve, maintain and exploit information, knowledge and decision superiority on the battlefield. The concept of Knowledge Management attempts to secure the learning experiences, as well as the work products, of the individuals who comprise an organization²⁵ because those captured and exploited experiences and products in fact represent “the capacity for effective action or decision making in the context of organizational activity.”²⁶

The Department of the Army, G6/CIO has written a comprehensive Strategic Plan for Army knowledge management. This plan recognizes that becoming a knowledge-based organization involves more than technologies – it requires deep cultural shifts – from traditional practices to collaboration, teamwork and innovation; from information sharing to knowledge sharing; from stovepipe to enterprise processes; and from traditional skills to Internet-Age competencies.²⁷ The Army’s construct applied consistently to Army tactical headquarters can more readily enable the Joint Force’s interagency and intra-agency information environment and build a more effective knowledge based joint force.

The Army’s concept for knowledge management is consistent with the Decision Superiority concepts of the Department of Defense and is essential to it. The National Military Strategy states that “Decision Superiority is the process that enables you to make decisions better and faster than an adversary – it is essential to executing a strategy based on speed and flexibility.”²⁸ It further states that we will turn our information superiority into a competitive advantage [our] adversary cannot match: decision superiority. Just as the Army knowledge management strategy recognizes the need for cultural and organizational change, so too the National Military Strategy recognizes that decision superiority requires new ways of thinking about acquiring, integrating, using and sharing information. It necessitates new ideas for developing architectures for command, control and communications and computers (C4) as well as the intelligence, surveillance and reconnaissance (ISR) assets that provide knowledge of our adversaries.²⁹ The Army can facilitate the tactical Joint task force’s ability achieve these goals as by remaining committed to effective knowledge management and the continued expansion and implementation of its knowledge management strategic plan.

The Army knowledge management strategic plan was developed to be applicable across the entire Army Enterprise: Active Army, DA Civilians, Army Reserves, and National Guard, during both peace and war. Its goals are to be achieved at all levels across the enterprise, with an emphasis on standardized, enterprise-level mission and business practices.³⁰ It is a construct applicable to the Joint Forces as well as the institutional Army. The aggressive

application of the guiding thirteen principles of Army knowledge management can speed the institutionalization of the knowledge management program.³¹ Then this solid and standardized foundation can further set the conditions for the joint force's success ensuring that our forces consistently maintain decision superiority as they are deployed into battle.

First, business rules, processes and information across the enterprise must be standardized.³² This is especially true when our warfighting formations are involved in joint and combined force efforts which interact with multiple national and international agencies on a daily basis. By broadening standards across each of our components, information-sharing at all force levels can be capitalized.

Second, unnecessary duplication, incompatibility and redundancy of data, systems and business practices must be eliminated.³³ The Capstone Concept for Joint Operations highlights the need to eliminate duplication, incompatibilities and redundancy further legitimizing the responsibility and authority of the joint force commander and supporting service components to take action to ensure compatibility compliance. This requires a change management program that looks at the Army enterprise and beyond to take human dynamics and human needs as well as equipments into account. A consistent change management program enables true change to be realized controlled and exploited.

Third, information must be captured and validated only once, and then reused across the enterprise.³⁴ This will ensure burden sharing and division of labor occurs in order to achieve Joint Capstone Concept envisioned efficiencies across the joint force while increasing confidence in the joint force's information. Organizational staffs must accept that their information belongs to the corporate organization first, every member!

Fourth, reuse before buying or building new.³⁵ Army headquarters that will serve as Joint Task Force headquarters need to assess available assets and develop processes and equipment solutions based on best practices and appropriate and interoperable technologies. The adaptation of information processes does not necessarily require new hardware; but does require new ways to exploit hardware on hand and a methodical planned disciplined acquisition strategy.

Fifth, emphasize cooperative strategies for satisfying the common needs of soldiers and civilians across the enterprise.³⁶ Given that knowledge management is primarily a human endeavor, a key component of a successful program requires that it meet a need of both the enterprise whole and its constituent members as well to be successful.

Sixth, enable and accelerate sound decision-making through architecture-based analysis and evaluation.³⁷ In order to analyze, evaluate and manage knowledge, one must inventory the

organizations knowledge components. The Army approach distinguishes between explicit and tacit knowledge elements. Explicit knowledge refers to what has been documented and available to everyone. Tacit knowledge refers to what an individual holds in his/her possession such as insights, hunches and judgment.³⁸ Once this is understood, the means in which to manage these information assets can be effectively designed and executed.

Seventh, ensure security and protection of sensitive information.³⁹ While serving as a prime enabler of the information age, cyberspace also serves as the “perfect environment” where asymmetric foes can strike “indirectly, invisibly, and from their perspective, undetected”.⁴⁰ The Internet presents a tremendous vulnerability to the protection of our national information.⁴¹ In the wild wild west of the internet connected world security remains paramount and must be accomplished by using trusted networks, acceptable procedures and technology designed into our processes.

Eighth, reduce the total cost of Information Technology / Information Management.⁴² With DOD’s move to Defense Knowledge Online, service components and joint headquarters are now able to design, purchase and implement enterprise solutions consistent across the entire defense community. This consistent approach has the potential to drastically reduce costs associated with training, maintenance, life-cycle management and information sustainment.

Ninth, use continuous improvement and evolutionary transformation.⁴³ As transformational organizations solidify, Army headquarters must effect change within their formations to ensure the future joint and combined task forces to which they are assigned are able to organize seamlessly. It is imperative they liaise with key external organizations and consider international agencies as well. Fusion Cells need to be a component of each operation center and knowledge management function and responsibility needs to reside in each. Fusion cells will act as the “trusted” traffic cops for information flow when problems arise between organizations, formalizing and expediting the information flow process and allowing continuous improvement and evolutionary transformation to occur.

Tenth, integrate performance management in every decision process.⁴⁴ Measuring and being able to accurately articulate success is paramount to continued success while at the same time exceptionally difficult. Technical measures such as time savings, cost savings and cost avoidance must be balanced with more intangible measures such as process value added and decision confidence. Knowledge managers must continually work to establish active feedback between performance measures and business processes.⁴⁵

Eleventh, post before processing.⁴⁶ This processing method when incorporated into a knowledge process allows items to be properly critiqued, reviewed and vetted for accuracy prior

to distribution or placing in a repository. Information is made available to all members of the organization in a timely and yet credible manner. Levels of reliability and applicability are thereby bolstered and information products are more useful and immediate when dealing with massive amounts of data and information.

Twelfth, everyone is a “teacher,” everyone is a “learner”.⁴⁷ As a result of information sharing being such a critical and yet abstract endeavor, the more decentralized and pervasive the process of managing, posting and obtaining information becomes, the more successful knowledge management will become. “Often, organizations need to be made aware that their performance is determined by the day-to-day actions of all.”⁴⁸ Therefore, every individual must be proficient to add value to the overall organization and holistically enable the synergistic effect of knowledge management.

And finally, every human interaction is viewed as an opportunity to acquire and share knowledge.⁴⁹ In the operational world of the joint force, every interaction must be an opportunity to quickly distribute information to the necessary agent in a timely manner. Knowledge management will be the process that maximizes “the human capacity (potential and actual) to take effective action in varied and uncertain situations. Strong leaders must help challenge the status quo and help the joint task force to facilitate knowledge operations.

Implementation

Thus armed with the organizational tenants of an effective knowledge management strategy, a comprehensive approach that includes education, training and promotion can continually address changing organizational, cultural informational needs. Within the Joint Force, a dedicated informed and disciplined team must assist members not permanently assigned as well as those organic to the task force to adapt to the organization. The team can build a strong organizational culture to carry the organization through the turmoil of task organization while remaining effective. Education, essential to ensure the theory behind the information sharing vision is clear, can answer the inevitable “why” questions with sound reasoning and build a foundation of understanding throughout the organization as change is facilitated. Once the processes and technology are established, training must allow the members of the organization to experience the new information-sharing environment in a “lab” setting where clarifying questions can be asked and issues addressed prior to integrating the new behavior into the everyday work routines.⁵⁰ New human behaviors and paradigm shifting practices will be instituted; therefore, the organization must provide the necessary support to

ensure success.⁵¹ Upfront reassurance; positive reinforcement and consistent demonstrations of success will greatly expedite the learning and implementation process.

Also key is the consistent promotion of the knowledge management concept. The future information sharing environment and benefits must be clearly articulated and envisioned by all members. A steady barrage of encouragement and motivation by organizational leadership will expedite success. After the education and training phases are complete and the new behaviors are in place on a day-to-day basis, various and creative incentives must also be offered to encourage positive reinforcement over an already negative and distrustful cultural environment.⁵² Only through an eventual change management cultural will we see unnecessary duplication, incompatibility and redundancy of data, systems and business practices permanently eliminated.

The methodology the Army has adopted to achieve knowledge superiority is through the achievement of five major goals. The initial step is to integrate knowledge management concepts and current best practices to continue to develop the knowledge-based force. This is followed by the adoption and implementation of Army cultural changes across the tactical level of the Army in order to become a knowledge-based organization at all levels. Joint forces can then harness organizational human capital to truly create knowledge-based organizations, followed by institutionalizing an Army-Like Knowledge staffs. Lastly, the joint force must manage the information structure as a system of systems to enhance capabilities and efficiencies.⁵³

Technology alone will never solve the growing information-sharing problem. However, once a knowledge management framework has been firmly implemented, then technology is capable of taking the organization to the next level of information awareness and decision effectiveness that very few thought originally possible.

Enabling Technology Tools

There are currently five categories of technology tools that can be used to support knowledge management activities. They are learning tools, content tools, discovery tools, relationship tools and collaboration tools.⁵⁴ The learning tools and the content tools support the transfer of knowledge and the building of a repository. The discovery tools are used to generate new knowledge from mounds of existing data, and thus they support knowledge creation.⁵⁵ The relationship tools support decisions in business processes by uncovering the preferences and needs of consumers, agents and organizations. Hence, they are used to create, transfer and build repositories of knowledge.⁵⁶ Collaborative tools enable a knowledge environment in which participants share data, information, knowledge, perceptions, ideas, and concepts.⁵⁷ The classic

military example of collaborative planning brings various actors with different functional and geographic areas of responsibility together to focus their attention on achieving assigned missions. The team gains a common understanding of the situation; exploits their differential knowledge, expertise, information and capabilities; and organizes the activities they control in time and space. The collaborating team avoids interference and benefits from a synergistic effect.⁵⁸ Technology tools that are available today have the capability to allow us to work in an environment from unclassified through top-secret levels, as well as with multinational partners. They allow us to do both voice and text chat and share a common operational view amongst those participating in the collaborative session. Advanced White Boarding is now commonplace, as well as multiple virtual workspaces.⁵⁹

The Joint Forces Command is making great strides in the collaborative field. They are actively pursuing a Virtual Information Warehouse as well as a Common Operating Picture. The Virtual Information Warehouse is a conceptual initiative that aims at establishing a primary repository for information and knowledge products necessary for joint operations in a collaborative environment.⁶⁰ The technology will allow access to information, which will be available in or through the “warehouse” and transparent to the user.⁶¹ The Common Operating Picture is important to collaboration and an essential contributor to shared situational awareness and understanding. It is a single identical display of relevant information shared by multiple users, organizations and commands across an entire theater.⁶² These concepts and capabilities are crucial to successful operations, especially when trying to orchestrate and synchronize complex knowledge elements across the joint force as well as in an interagency and multinational effort. Consistent with these concepts, the Army is continuing to move expand the use of its Web-based Enterprise Portal as an individual user’s personalized point of entry to information. It has the potential to link into their virtual warehouse, once the concept fully matures.⁶³

While search and information retrieval has made real advances in the past decade, most searchers simply cannot review scores of returned search results and manually cull them for useful knowledge. Even when dealing with the most highly relevant results, result sets can quickly number into the hundreds or thousands, rapidly outstripping human capacity to process and absorb them.⁶⁴ Recent advances in this field have focused on using taxonomies to categorize or organize information into meaningful frameworks that reduce information overload and add some logical structure that humans can rapidly navigate to find high concentrations of topic-specific, related information.⁶⁵ Taxonomies are flexible structures, as they can be developed to cover many different topics to any desired level of granularity. Many standards or

industry-accepted taxonomies are becoming readily available and key search and classification vendors are making good use of taxonomies, thus provoking an information retrieval paradigm-shift long understood by library scientists.⁶⁶

And lastly, just over the horizon there is the emergence of a new combination of information architectures. These are the newly developed intelligent networks, semantic web and synthetic information architectures, along with federated super-sized data systems. The semantic web will provide the ability to use Extended Markup Language (XML) and web ontology language to quickly gain meaning from the web. The idea will be to gain more context from the web rather than just scores of information and data. These emerging technologies, along with the tools previously discussed, will finally make it possible to provide real-time access to distributed data while protecting privacy and providing full security controls to the owners of each discreet data element.⁶⁷ This brief survey of the available and emerging tool sets readily shows the complexity of the knowledge management technology environment. And given the substantial costs in terms of time, resources the risk associated with a knowledge strategy at any level in our Army. These tools can not simply be pushed into the CORPS and Division staffs without the facilitating promotion, training and education.

Conclusion

It is imperative our tactical headquarters have a consistent knowledge management structure across the Army at the CORPS and Division level. The future joint force must be able to share knowledge effectively both internally and externally with key interagency partners in a way that moves beyond the basics supplied by the classic liaison officer from each of the key supporting organizations. Consistently structured knowledge management staffs with the requisite responsibilities, authority and training need to exist at standing Army CORPS and Division headquarters organizations to ensure fluid information exchange processes are maintained and constantly adapted to the operational and technical environment. Trusted networks need to be established along with agreed procedures and biometrics for auditing and authentication. The intent should be to become a living information organization that continually seeks to eliminate staff seams and stove piped information flows. The staff will identify which information exchanges occurred only incidentally and put in place procedures and technologies to pass information to keep each other more than intermittently satisfied.

The construct and processes of knowledge management need to be further implemented by taking the current best practices and institutionalizing them in our transformational CORPS and Division headquarters. "While the U.S. armed forces have made some major strides in

recent decades, especially in getting different branches to work more closely together, they still have a long way to go before they have an organizational structure that makes the most effective use of their high-tech equipment.”⁶⁸ Enterprise technical solutions must be applied in a system of systems paradigm to ensure rapid information exchange with the goal of achieving total knowledge and information dominance over our adversaries while remaining agile and adaptable. An initial practical solution can include a standardized integrated knowledge management portal, effective knowledge repository, and an expertise locator, linked to a collaboration tool. As additional technological solutions become available they can be systematically inserted within and across the CORPS and Divisions in an efficient and effective enterprise manner.

The greatest mistake the United States can make is to allow itself to believe the current level of information sharing is sufficient to keep our forces preeminent in the world. “Defeating an insurgency still requires the kind of messy, block-by-block fighting that many thought had been rendered obsolete by the dawn of the Information Age. Operation Iraqi Freedom showed that there were still some things that not even the most advanced machines could do.”⁶⁹ The establishment of a consistent organization construct in the form of a standardized knowledge management team along with implementing key technical solutions will ensure our forces evolve at the CORPS and Division level beyond current disjointed and rudimentary technical efforts. The Army must resist its normal tendency to focus on hardware and technology and focus on the more difficult challenges of organizational structures, staff processes and fundamental information constructs. “Jeff Wacker, who works as the futurist for Electronic Data Systems Corporation (EDS), once wrote a company memo predicting which jobs would not be around in fifteen or twenty years. His first category was the CIO. “There will still be a CIO,” he wrote, “but the chief information officer will be replaced with a chief *integration* officer. Information technology will be so fully embedded in every aspect of a business that the IT organization will move away from technology to the integration of business processes.”⁷⁰ Only by implementing a standardized, integrating CORPS and Division Army knowledge management solution can our Army lead joint and combined task forces move beyond the beginnings of network-centric warfare. Standardized knowledge management can create a synergistic effect between *people*, *processes*, technology and organizations further achieving the vision of successful complimentary Joint forces. Information and knowledge sharing be realized and allow the United States Armed forces to move beyond network centric concepts to a truly knowledge enabled force capable of dominating our adversaries through the 21st century.

Endnotes

¹ Max Boot, *War Made New: Technology, Warfare, and the Course of History 1500 to Today*. (New York, Gotham Books, 2006), 16.

² Capstone Concept for Joint Operations, 2.0 August 2005, 5.

³ Martin Van Creveld, *Technology and War from 2000 B.C. to the Present* (New York, Maxwell Macmillan International, 1991), 1.

⁴ Max Boot, *War Made New: Technology, Warfare, and the Course of History 1500 to Today*. (New York, Gotham Books, 2006), 15.

⁵ Ibid., 455.

⁶ Ibid., 10.

⁷ Ibid., 459.

⁸ Bryan Bergeron, *Essentials of Knowledge Management* (Hoboken; John Wiley & Sons, 2003), 8.

⁹ Donald H. Rumsfeld, *Defense Quadrennial Review Report*, Washington, D.C.: U.S. Government Printing Office, 6 Feb 2006. vi.

¹⁰ Ibid., vii.

¹¹ Thomas L. Friedman, *The World is Flat A brief History of the Twenty-first Century*, (New York, Farrar, Straus, Girous, 2006), 283.

¹² Michael E.D. Koenig and T. Kanti Srikantaiah, eds., *Knowledge Management, Lessons Learned, What Works and What Doesn't* (Medford, NJ: ASSIS&T, 2004), 281.

¹³ David w. DeLong, *Lost Knowledge Confronting the Threat of an Aging Workforce*, (New York, Oxford University Press, 2004), 46.

¹⁴ Maribeth Achterberg, "How Culture Affects Information Sharing in an Organization," 30 November 2001; available from http://www.kwork.org/White_Papers/cultural.html; Internet; accessed 4 March 2007.

¹⁵ Juris Kelly, "Overcoming Information Sharing Obstacles and Complexity," November 2003; available from <<http://www.iacptechnology.org/Library/OvercomingInfosharing.pdf>>; Internet; accessed 4 March 2007.

¹⁶ Thomas H. Davenport and Laurence Prusak. *Working Knowledge: How Organizations Manage What They Know* (Boston, MA; Harvard Business School Press, 2000), 96.

¹⁷ David w. DeLong, *Lost Knowledge Confronting the Threat of an Aging Workforce*, (New York, Oxford University Press, 2004), 21.

¹⁸ Thomas H. Davenport and Laurence Prusak. *Working Knowledge: How Organizations Manage What They Know* (Boston, MA; Harvard Business School Press, 2000), x.

¹⁹ Ibid., xi.

²⁰ Ibid.

²¹ Micheal E. E. Koenig and T. Kanti Srikantaiah, eds., *Knowledge Management, Lessons Learned, What Works and What Doesn't* (Medford, NJ; ASSIS&T, 2004), 487.

²² David w. DeLong, *Lost Knowledge Confronting the Threat of an Aging Workforce*, (New York, Oxford University Press, 2004), 119.

²³ Chief Information Office, Untied States Army. *The Army Knowledge Management Strategic Plan*, 2d ed Washington, D.C.: U.S. Government Printing Office, 2003, E-2.

²⁴ Office of the Secretary of Defense, Comptroller, "Knowledge Management," 21 September 2004; available from <http://www.defenselink.mil/comptroller/icenter/learn/knowledgeman.htm>; internet; accessed 5 March 2007.

²⁵ Melissie Clemmons Rumizen, *The Complete Idiot's Guide to Knowledge Management* (Madison, WI: CWL Publishing Enterprises, 2002), 1.

²⁶ David w. DeLong, *Lost Knowledge Confronting the Threat of an Aging Workforce* (New York, Oxford University Press, 2004), 21.

²⁷ Chief Information Office, Untied States Army. *The Army Knowledge Management Strategic Plan*, 2d ed Washington, D.C.: U.S. Government Printing Office, 2003, ii.

²⁸ Richard B. Myers, *National Military Strategy of the Untied States of America 2004* (Washington, D.C.: U.S. Government Printing Office, 2004), 17.

²⁹ Ibid.

³⁰ Chief Information Office, Untied States Army. *The Army Knowledge Management Strategic Plan*, 2d ed Washington, D.C.: U.S. Government Printing Office, 2003, 2.

³¹ Ibid., 3.

³² Ibid.

³³ Ibid.

³⁴ Ibid.

³⁵ Ibid.

³⁶ Ibid.

³⁷ Ibid.

³⁸ Micheal E. E. Koenig and T. Kanti Srikantaiah, eds., *Knowledge Management, Lessons Learned, What Works and What Doesn't* (Medford, NJ; ASSIS&T, 2004), 497.

³⁹ Chief Information Office, United States Army. *The Army Knowledge Management Strategic Plan*, 2d ed Washington, D.C.: U.S. Government Printing Office, 2003, 3.

⁴⁰ Wayne Hall, *Stray Voltage; War in the Information Age* (Annapolis, MD: Naval Institute Press, 2003), 53.

⁴¹ Brian P. Hamilton, *Our National Information Infrastructure; An Immediate Strategic Concern In National Security Policy* (Carlisle Barracks: U.S. Army War College, 19 March 2000), 1.

⁴² Chief Information Office, United States Army. *The Army Knowledge Management Strategic Plan*, 2d ed Washington, D.C.: U.S. Government Printing Office, 2003, 3.

⁴³ Ibid.

⁴⁴ Ibid.

⁴⁵ Office of the Secretary of Defense, Comptroller, "Knowledge Management," 21 September 2004; available from <http://www.defenselink.mil/comptroller/center/learn/knowledgeman.htm>; internet; accessed 5 March 2007.

⁴⁶ Chief Information Office, United States Army. *The Army Knowledge Management Strategic Plan*, 2d ed Washington, D.C.: U.S. Government Printing Office, 2003, 3.

⁴⁷ Ibid.

⁴⁸ Micheal E. E. Koenig and T. Kanti Srikantaiah, eds., *Knowledge Management, Lessons Learned, What Works and What Doesn't* (Medford, NJ: ASSIS&T, 2004), 514.

⁴⁹ Chief Information Office, United States Army. *The Army Knowledge Management Strategic Plan*, 2d ed Washington, D.C.: U.S. Government Printing Office, 2003, 3.

⁵⁰ Maribeth Achterberg, "How Culture Affects Information Sharing in an Organization," 30 November 2001; available from http://www.kwork.org/White_Papers/cultural.html; Internet; accessed 4 March 2007.

⁵¹ Ibid.

⁵² Ibid.

⁵³ Chief Information Office, United States Army. *The Army Knowledge Management Strategic Plan*, 2d ed Washington, D.C.: U.S. Government Printing Office, 2003, 12.

⁵⁴ Alton Chua, "A Framework for Knowledge Management Implementation," *Journal of Information & Knowledge Management* 2, no. 1 (2003): 82.

⁵⁵ Ibid., 83.

⁵⁶ Ibid., 83.

⁵⁷ United States Joint Forces Command, Operational Implications of the Collaborative Information Environment (CIE), *The Joint Warfighting Center Joint Doctrine Series*; Pamphlet 5 (Washington, D.C.:U.S. Joint Forces Command, 1 June 2004), 1.

⁵⁸ Ibid.

⁵⁹ Ibid., 11.

⁶⁰ Ibid., 10.

⁶¹ Ibid., 11.

⁶² Ibid., 11.

⁶³ Ibid., 11.

⁶⁴ Alkis Papadopoulos, "Answering the Right Questions about Search," *Information Today* 27 (July/August 2004): S6 [database on-line]; available from ProQuest; accessed 9 March 2007.

⁶⁵ Ibid.

⁶⁶ Ibid.

⁶⁷ Robert David Steele, "Information Peacekeeping and Inter-Agency/Multi-National Information Sharing Proposed as Focus for 109th Congress – Intelligence Reform is Dead," 30 November 2004; available from <http://www.news.corporate.findlaw.com/prnewswire/20041130/30nov2004143640.html>; Internet; accessed 10 March 2007

⁶⁸ Max Boot, *War Made New [Technology, Warfare, and the Course of History 1500 to Today]* (New York, Gotham Books, 2006), 434.

⁶⁹ Ibid., 418.

⁷⁰ Thomas L. Friedman, *The World is Flat A Brief History of the Twenty-first Century* (New York, Farrar, Straus, Girous, 2006), 284.